



Fuel Cell-Fuel Cell Hybrid System

Opportunity

Research on the patented technology “Fuel Cell-Fuel Cell Hybrid System” is currently inactive but ready for scale-up. The technology is available for licensing and/or further collaborative research from the U.S. Department of Energy’s National Energy Technology Laboratory.

Overview

This patented invention provides a fully integrated hybrid system by using two fuel cells in tandem. A solid-oxide fuel cell (SOFC) is used to electro-chemically introduce oxygen into a fuel stream to supercharge the fuel stream with oxygen for more efficient thermodynamic conversion by a low-temperature fuel cell.

Fuel cells provide high expectations in the future to deliver clean, reliable, and uninterrupted power nearly 100 percent of the time. Fuel cells offer the advantages of efficiency by converting chemical energy directly to electricity and furthermore have no moving parts, thereby eliminating failures associated with pumps, blowers, heat exchangers, and other systems. However, all fuel cells, particularly high-temperature fuel cells, require spent fuel/waste heat recovery subsystems, and low-temperature fuel cells require fuel reforming subsystems, which lower the efficiency of the entire system.

Although SOFCs provide durability and economic advantages over liquid electrolytic fuel cells, SOFCs at present typically operate at high temperatures and therefore require a means for disposing of the released heat. As such, they may become bulky, noisy, and comprise several moving parts that require frequent maintenance. Systems that combine SOFCs and molten carbon fuel cell characteristics contain a liquid, which gives rise to corrosion and electrolyte loss.

This patented SOFC tandem system would combine the advantages of both high temperature and low temperature fuel cells without the above-mentioned disadvantages of each. In addition, the tandem system would be modular and scalable for use in the transportation and propulsion power sectors and should further be adaptable to hydrogen co-generation in industrial settings..

Patent Details

U.S. Patent No. 6,623,880; issued: September 2003; titled “Fuel Cell-Fuel Cell Hybrid System.”

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Significance

- Fully integrates hybrid fuel cell systems
- Uses two fuel cell systems in tandem
- Provides nearly 100 percent balance-of-plant reliability
- Combines advantages of high-temperature and low-temperature fuel cells
- Offers potential for modular and scalable systems

Applications

- Transportation and propulsion power sectors
- Hydrogen co-generation industrial settings

November 2012